Cost effective, farmer- and environment-friendly biocontrol of aflatoxin in chili peppers (*Capsicum* spp.)

Donor: Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ)

Timeframe: 2012 - 2013

Background: Like in most tropical countries, chili peppers are a popular spice in Nigeria and an important cash crop for farmers. Nigeria is the 7th largest producer of chili peppers, with an acreage of almost 500,000 ha. Based on data from other countries, it is known that chili peppers can be highly contaminated with aflatoxins. For example, in Pakistan, 73% of whole and 86% of ground chilies were contaminated with concentrations of up to 90 µg/kg in powdered and 96 µg/kg in whole fruits. The maximum levels (MLs) permitted for spices in the European Union are 5 µg/kg for aflatoxin B1 and 10 µg/kg for the total of aflatoxins B1, B2, G1 and G2. Access to the attractive EU market is denied for consignments which exceed these MLs. For example, groundnut trade from Nigeria to the EU has stopped years ago and has been reduced to very low levels from other West African countries due to non-compliance with the EU standards for aflatoxins.

Chilli fruit covered with *Aspergillus* (inset) due to improper drying of fruits (*source: Agropedia*)

Project summary: In this project, the efficacy of the aflatoxin biocontrol technology is tested in chili peppers in Nigeria. The reason for doing the research in Nigeria is because in this country the bio-control product aflasafe is already developed to near-commercial stage and approval for its use on maize and groundnut has been obtained from the authorities. However, this project bears high impact potential beyond Nigeria. If successful, the technology can easily be developed and adapted in other countries around the globe following the identification of native non-toxigenic strains of *Aspergillus flavus* in each country. The project enhances efforts to increase farmers' income through the development of efficient chili value chains. The likelihood that the product will be effective in chilies is high. Similar to maize and groundnut infection, the critical period when infection takes place in chili peppers is during fruit ripening when the cuticle becomes fragile, and insect pests and drought stress cause damage, and also during post-harvest drying.

Objectives

- to collect chili fruit samples from farmers' households, and rural and urban markets, analyze the *Aspergillus* fungal community and the aflatoxin contamination in the samples, and compare aflatoxin levels with international safety standards
- to apply aflasafe in farmers' fields in three production areas (Kano in the north, Nassarawa in the central belt, Oyo state in the southwest), and analyze the *Aspergillus* population structure and aflatoxin contamination of fruits at harvest and at three and six months post-harvest
- to train scientist from the National Horticultural Research Institute (NIHORT) at IITA in analysis of *Aspergillus* communities in soil and fruits
- to inform participating farmers on aflatoxins and related health and economic risks, and advise them on proper drying and storage of chili peppers to reduce aflatoxin contamination

Outputs

- aflatoxin contamination in chilies surveyed in a baseline study and risk of exposure assessed
- efficacy of aflasafe to reduce aflatoxin contamination in chilies determined
- capacity at NIHORT in microbial analysis increased
- awareness on health risks from aflatoxins, trade implications and need for proper storage created among project farmers

Major partners: International Institute of Tropical Agriculture (IITA), National Horticultural Research Institute (NIHORT), University of Göttingen (Germany)

Target country: Nigeria

Crop: chili pepper